

* Answer the ones that *
 * are starred or circled *

Activity 14 Exponential Functions $y = b^x$

Name _____

In this lesson we explore the effect of changing b in the equation $y = b^x$, where b is positive and not equal to 1.

1. Use a graphing calculator to graph each of the following equations. Then complete the chart. Clear the screen after graphing the fourth equation.
 The suggested range will produce a graph that is easy to read.

Suggested Range

Xmin = -5
 Xmax = 5
 Xscl = 1
 Ymin = -1
 Ymax = 20
 Yscl = 5

Equation	Sketch	Value of b	Increasing or decreasing?	y -intercept
$y = 2^x$				
$y = 3^x$				
$y = 5^x$				
$y = 8^x$				
$y = 0.5^x$				

Equation	Sketch	Value of b	Increasing or decreasing?	y -intercept
$y = 0.3333^x$				
$y = 0.2^x$				
$y = 0.125^x$				

2. Use the results to answer the following questions.

a. What single point do all the graphs have in common? Why? _____

b. As b increases, what happens to the graph? _____

c. As b gets closer to one, what happens to the graph? _____

d. Describe the graph for $b = 1$. _____

e. Describe the graphs for $0 < b < 1$. _____

f. Describe the domain of all the functions $f(x) = b^x$. _____

g. Describe the range of all the functions $f(x) = b^x$. _____

h. Compare the values of b in the first four equations with the values of b in the second four. What relationship exists between pairs of graphs of the form $y = b^x$ and $y = \left(\frac{1}{b}\right)^x$? _____

i. Predict what the equation would be for the curve that results from reflecting $y = 2^x$ across the x -axis. _____
Test your prediction with your calculator.

Activity 15 ► Exponential Functions $y = b^{-x}$

Name _____

In this lesson we explore the effect of changing b in the equation $y = b^{-x}$, where b is positive and not equal to 1.

1. Use a graphing calculator to graph each of the following equations. Then complete the chart. Clear the screen whenever necessary.

Equation	Sketch	Value of b	Increasing or decreasing?	y -intercept
$y = 2^{-x}$				
$y = 0.5^{-x}$				
$y = 4^{-x}$				
$y = 0.25^{-x}$				
$y = 5^{-x}$				
$y = 0.2^{-x}$				

Equation	Sketch	Value of b	Increasing or decreasing?	y -intercept
$y = 10^{-x}$				
$y = 0.1^{-x}$				
$y = 3^{-x}$				
$y = 0.3333^{-x}$				

2. Use the results to answer the following questions.

(between 1+2, 3+4)

- What is the relationship between the values of b in each pair of equations? _____
- How do the graphs of each pair compare? _____
- What point do all the graphs have in common? _____
- If $b > 1$, what can be said about the graph? _____
- If $0 < b < 1$, what can be said about the graph? _____
- Describe the domain of all the functions $f(x) = b^{-x}$. _____
- Describe the range of all the functions $f(x) = b^{-x}$. _____

3. Write another equation that has the same graph as the one produced by $y = 2^{-x}$, and as the one produced by $y = 0.5^{-x}$.

_____ and _____